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REPORT

ON A

DEVELOPING SCHOOL,

AND

SCHOOL-SHOPS,

BY A COMMITTEE APPOINTED BY THE

American Social Science Association,

AND READ AT THEIR ANNUAL MEETING

IN BOSTON, MASS.,

JANUARY 10, 1877.

BOSTON:
PRESS OF ROCKWELL & CHURCHILL, 39 ARCH ST.

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Suppl. of No. 11 in N 90 a. 29

From D. R.

Dear Sir: — We send you the following copy of a report of a committee appointed by the American Social Science Association, which was read at their annual meeting held Jan. 10, 1877, at the Lowell Institute Hall, Boston.

It will be seen that they strongly recommend that a

DEVELOPING SCHOOL,

AND

SCHOOL-SHOPS

should be established by the city or State, or an endowed corporation, — taking the ground that all boys, after leaving our public or private schools, are as much entitled to a free education of the hand as they have been to the education of the head given them at the public schools, — where they may be taught that trade, art or calling for which they are best fitted by nature, as ascertained by the Developing School.

TECHNICAL EDUCATION.

A committee appointed by the American Social Science Association, consisting of S. P. Ruggles (Chairman), Wendell Phillips, Elizur Wright, Edward E. Hale and John Newell (Secretary), to report on a plan for Developing Schools, and School-Shops, present the following: —

DEVELOPING SCHOOL,

AND

SCHOOL-SHOPS.

There is an order of education, which may be called special, by which every individual in a community in harmony with his choice shall not only be cultivated into an able man, but shall, in addition, have a practical training in that peculiar knowledge and specific skill by which he becomes habitually a machinist, mason, carpenter, builder, architect, engineer, ship-builder, naval architect, etc. Each of these duties must be learned by some person, over and above and in addition to all that he knows in common with others; and it is plain that the work of each citizen will have value in exact proportion to his skill. In other words, the value of a nation's work will vary with the excellence of its national system of technical education.

The question comes home to every one of us, How shall we train the children and youth, who are to succeed us in this world, changed by science and invention, for the wide field of responsibility that lies before them? The conditions

of society have undergone such a radical change during the last forty or fifty years that the laborer must now receive a different practical education from what was required two generations ago. Apprenticeship having departed, never to return in its ancient form, something else must take its place, and give to our artisans practical instruction. Every youth should have placed within his reach such technical instruction as will enable him to become the master of his trade, art or occupation. By the old apprentice system, the boy was bound to the master some seven years, and received his instruction more by his own observation than by any direct teaching. We recommend the plan suggested by Mr. S. P. Ruggles, and so universally endorsed by the press, in contradistinction to the former system of our fathers, — that the youth, whenever he has completed his general education in any of our public or private schools, may enter what may be called a

DEVELOPING SCHOOL,

so established and arranged as to give all the pupils a good general idea of all the different trades, arts or callings, in order that it may be ascertained by themselves or the superintendent for what kind of business they have the greatest natural genius. Imagine, if you please, one very large room, with a steam-engine and boiler in the middle of it, so that all pupils that have any taste for the management of steam, or steam-engines, could examine every point, and readily understand all about it. Then we would have a carpenter's bench, with a variety of tools, to show how that work was done; then perhaps turning-lathes, to show how the wood-turning business was performed; then, with the aid of blackboards and carving-tools, it might be seen how drawing and carving is done, by those that have any inclination for that business. We should also have planing-machines, lathes, upright drills, jig-saws, etc., to represent the machinist business. Foundry work should be shown by

having the usual fixtures for sand, and two and three part flasks for moulding, etc.; the casting could be done in soft metals, as lead, zinc or tin, which could be reused, as the whole art in foundry work consists in the different manner of moulding; and almost all other trades or methods of doing work could be pretty well represented in the same room.

The School-Shop.

As soon as it should be ascertained what kind of business the pupil is best fitted for by nature, he would be recommended to the School-Shop where that *trade* should be taught, and be more thoroughly instructed in two years, and become a better mechanic, than in six or seven years under the old system of learning a trade.

School-Shops *vs.* Workshops.

We would here like to show the difference between mechanical shops of all kinds that should be established to teach a trade, art, or calling, and the shops already established for doing work of that particular kind for profit. For example, we will speak of the machine-shop, which, as now arranged, is fitted up with the general tools and fixtures necessary to do a particular class of work, such as locomotive building, or steam-engine building of various sizes, or printing-press machinery, or factory machinery, or tool-making, etc., etc., neither of which would have every variety of tool or fixtures in any one shop for doing every kind of machine work. But when we fit up a machine-shop for the express purpose of *teaching* that trade or art, it should contain, not only planers, lathes, upright drills, gear-cutting machines, etc., for doing work generally, but should contain every tool and appliance of every name and nature that is ever used in any shop whatever, so that the student would become acquainted with every manner of doing work and the management of every kind of tool or device ever used

in any place or business for doing work. Also there should be a very particular selection of the kinds of work to be made at the school-shops, consisting of lathes and planers and other tools that are always kept on sale, large and small work of different kinds, making as great variety of work as possible for the pupil to practise upon in building, so that he would get a thorough knowledge of all and every part of the machine business; and each pupil would be taught to make the whole, and put together every machine that was being constructed.

The School-Shop Training.

In the school-shop the pupil would advance from a lower degree of instruction to a higher as rapidly as his thorough knowledge and good workmanship would justify. The instructor would be paid a satisfactory salary, and not be permitted to make merchandise of the time of the student. All machinery, or articles made by the students, could be put on sale, or be sold at auction, and the proceeds appropriated towards defraying the expenses of the "school-shops."

The great and rapid change in the division of labor and the introduction of machinery, and the great variety of appliances for doing all kinds of business, show plainly the importance of changing the system of instruction at the present time. We think it will be admitted that it will be of incalculable advantage to the youth, and would prove in the end to be very economical for the whole community.

An Age of Specialists.

Formerly a carpenter was taught to build a whole house: he used to jack down his floor-boards, make sashes, blinds, doors, stick out his mouldings, build his stairs, split out the laths, etc.

Now this work is divided into specialties. We have planing-mills, where boards are planed by the wonderful

"planing-machine" to an equal thickness; tongued, grooved and jointed if desired; also, machines run by steam for sticking out mouldings of every size and description. There are special establishments for making blinds, sashes, and doors of every description and variety, by machinery invented and adapted to that special purpose. Stair-building, formerly a part of the carpenter's trade, is now a specialty or business by itself. Great changes have taken place in the machine business, caused by the subdivision of labor and the introduction of various machines and appliances to perform the labor formerly done by hand. Instead of chipping and filing to make a straight edge or level surface, the material is now placed upon the planer for planing iron, where the edge is made perfectly straight, or the surface perfectly level, in one-tenth the time formerly required before the introduction of the planing-machine. This is true of other varieties of work, by means of upright drills, jig-saws, screw-cutting apparatus, polishing and emery wheels, universal chucks and other appliances to the lathe, together with other apparatus which facilitates the manufacture of the various parts of the work. It is well known there is no place at the present, nor has there been for some time past, where a boy could "learn a trade."

Adapting Education.

We boast of our liberal institutions, and our admirable form of government; nay, more, of our *intelligence*. It is admitted that we have done much for the cause of learning; but who cannot perceive how much remains to be done before we can justly lay claim to that noble, refined and practical excellence which ought to adorn a great, a prosperous and free people? We must strike out new paths. We must advance with the world. How many men know anything at all of the materials with which they work?

We are pleased to learn that we have the hearty approval and co-operation of Mr. John D. Philbrick, the experienced

Superintendent of the Public Schools of Boston, in relation to the above-proposed plan.

In order to prevent misapprehension by those who have desired information in relation to the many articles published upon this subject in our public papers during the past year, we would wish to be distinctly understood that it is the object of the above plan to give to all the youth leaving our public or private schools the opportunity of obtaining a perfect knowledge of his chosen trade or occupation in the shortest possible time. Every boy, rich or poor, is, we think, as much entitled to be taught a good trade as to have an education in our public schools. We also believe the proposed plan would be self-supporting in a short time after being once put in successful operation.

To recapitulate: —

First. There would be great advantage gained by selecting the right youth (by the Developing School) for the right business.

Second. The boys would be *taught* the trade, instead of getting their knowledge by observation, as was the case by the former plan; and not be kept on work which would be most profitable for the master, as it would be his whole object to *teach* the boys, instead of making profit on their work.

Third. The school-shop would be much more perfectly fitted up (as described) to *teach* the business than any shop to do work for profit, as all shops heretofore have only been fitted with such tools and appliances as were necessary to do their particular class of work.

Fourth. The kind of work selected to be made by the boys would be both large and small, embracing as great a variety as possible, in order to give them a perfect knowledge of every branch of the business.

Fifth. There would be *good moral discipline* in the school-shop, the boys not being mixed up with journeymen and all classes usually found in all shops as generally established.

Sixth. There would be no more expense to the boy while learning the trade and making him a producer, than there was while getting his public-school education.

Seventh. The worth of the work made by the boys would probably pay current expenses after a very short time.

MR. PHILLIPS' REMARKS.

Wendell Phillips was called on to give his opinion. He said: One of the great problems which confronts republican statesmanship is how to manage the population of cities. The tendency of our time is to gather men into cities. These treble and quadruple while the country only doubles. In every large town and great city is always present a vicious class, a burden and check on the welfare of the community, ready at any moment to become dangerous. The education and moral training of these is of the first importance. Lacking this, republican institutions are sure to be a failure. Every city has two kinds of education for this class: one is the schools; the other is the tolerated temptations and houses of vice. These *educate* men just as much as other schools do. Their results are more immediately visible and more easily measured than those of the book-schools are. While there lies on our Chief of Police's table a perfect list of every house in the city devoted to vicious indulgence, and such houses are not closed, they must be considered a tolerated and recognized means of training the masses.

Now, idleness is one of the first temptations to vice. Children should be taught how to work, and, if possible, trained to love work. Again, one of the first safeguards against dishonesty is, to know how to make an honest living.

Seven out of ten who come out of our public schools will prefer a trade or be obliged to make their living by the work of their hands. My experience is that hundreds leave school at fifteen years of age, wholly unable to do anything for which any man would be willing or could afford to give them a dollar.

Here is the ready and fruitful source of vice and danger in large towns and cities.

In my judgment, we have no right to take a man's child from him and keep him until he is fifteen, or to induce a man to trust his child with us until he is fifteen, and then hand him back unable and unfit to earn his bread. We have done the boy and the city a harm rather than a good. Education means fitting a man for *his* life. We have rather unfitted than fitted such a boy for the life of labor which is to be *his* life.

Of course I do not object to any liberal knowledge we give him. Neither do I now and here intend to notice or criticise the perfection or imperfection with which this is done. On that I have my opinions, and I do not consider our success in that line anything to be proud of. But I maintain that as respects that large class of young men and women who are to earn their bread by the labor of their hands, our *system* is not as good as that which prevailed a century ago, and still prevails in our small towns. The boy went to school six months, and helped his father on the farm or in his trade the other six. At sixteen or eighteen such a boy came into life able to maintain himself, to stand on his own feet, a help, not a burden or danger to the community; his life a career, not a lottery; the city an opening and opportunity to him, not merely a temptation.

Men wonder sometimes at the extraordinary success of what we call self-educated men. Most of them had such a training as I have described, and if they had failed when competing with men merely book-trained, that would be more matter of their wonder than their success is.

I do not ask to have this old system back again; but it gives us a good hint how to amend ours.

The boy who is going to college has two or three more years of education given him to fit him for his future. Why should not the city extend to the children who prefer some mechanical trade equal favors, parallel advantages? the same amount of training for their future that the college

boy has for his? The discrimination against those who prefer to work with their hands is very unjust.

Our system of education helps the literary class to an unfair extent when compared with what it affords to those who choose some mechanical pursuit. Our system stops too short; and as a justice to boys and girls, as well as to society, it should see to it, that those whose life is to be one of manual labor should be better trained for it; the system Mr. Ruggles proposes seems to me admirably adapted to this end. Its main features must be added to our Public School System, which daily becomes more unequal to the task it assumes.

The Developing School is an entirely new suggestion, and an instrument and help to education of great value.

We put a child into a hall or school, where he sees every variety of mechanical work going on. He tries his hand at any he fancies. Soon his natural bent or taste shows itself. His peculiar genius chooses and clings to some one kind of work. *He has found his calling* — the square peg, as the phrase is, has found the square hole — and is not obliged to stagger and stumble through life a square peg in a round hole. This natural bent once found out, we hand the child over to that school-shop, which teaches his particular trade, and thus fit him for his life.

In this school he should be broadly trained in all that pertains to his chosen calling; not be crippled by being confined to some one small item, or portion of it. He should not be crippled by being set — as we used to say when pins were made by hand — to make a pin's head or point all his life. If one portion of his chosen trade fails him, he should have some insight into all its particulars, and be thus able in almost any event or emergency to stand on his feet an independent man. Never let us lose the well-known characteristic of the Yankee race, that no shock can ever shake one off his feet, and no fate place him where he would not be worth his keep.

MR. HALE'S REMARKS.

Mr. Hale followed Mr. Phillips. He called attention to the loss which the community sustains by placing boys in occupations for which they are not fitted by their native abilities. He spoke also of the difficulty of educating boys in accordance with their native ability, even when that ability has been ascertained. He took, as an illustration, the difficulty, amounting almost to impossibility, of training a Boston boy to a sailor's life. He asked the audience if anybody remembered an instance within the last ten years when a Boston boy had been trained to a life at sea. Yet there is no question but that there is a passion for the sea in our blood. We are the descendants of the Vikings; and some of the greatest achievements of our race have been its victories on the ocean. That is only one instance, among many, of the way in which we are neglecting the native ability of our own children, in our drift or habit of turning all our boys into tradesmen.

Now, the great duty of the State is to make the most out of every child born in the State. These children are born with great diversity of ability, and they must be trained to every variety of calling, if the State be wise. If Jenny Lind be born here, she must be trained to music; if John Milton be born here, he must be trained to letters; and none of the follies of Adam Smith, or of the other economists, must condemn them to heading pins or spinning cotton. But, as we live, we are fast losing the opportunities for this variety of training. We begin bravely on the broad system of the public schools. But it must be remembered that it is said that the average Boston boy leaves school forever before he is twelve years old. What is it, then, for which you have trained him? Anybody who knows the real openings for those boys will tell you that it seems as if they were fit for nothing but to be news-boys or cash-boys in the great retail shops, or sellers of lozenges at the door of the Museum.

Now, these are not good preparations for life. Nobody ever saw a grown-up cash-boy, or a grown-up lozenge-boy. My friends, the manufacturers, say that they are glad to have a few of these boys in their mills; but I have to say to them that ten hours a day at the loom or the spinning-frame is not a good education for manhood or womanhood. And I have to remind them that the prime business of a Christian State is not to make cottons, but to make men and women.

Now, the report has told you what are the causes for the difficulty in training boys to the use of their hands and heads together. We want the trained mechanic as much as we ever did. But our system, alas, no longer permits the trained man in his workshop to give a personal training to the boy who is to learn. Our system even keeps boys out of the sight of workmen, so that they really tell a story of a boy of sixteen, who had never seen any mechanic at his work, except a plumber, — and that boy chose a plumber's trade because he did not know what else to choose! What follows all this difficulty in teaching boys to use the powers God has given them? Why, there grows up a race of inefficient men, who have not learned to do anything at all. They are left in the grade of mere brute labor, because they have learned no art or handicraft in their boyhood.

Mr. Hale continued: —

Here is the point of view from which I look upon this subject: For more than twenty years now, it has been my duty to study all the questions of city poverty, of pauperism, and of other misery; and I tell you what any working minister will tell you, that, after intemperance, the worst evil you have is your body of untrained laborers, and that your present social status makes no provision for the training of labor. It is to supply this central need that Mr. Ruggles proposes his plan of the Developing School, and the schools connected with it.

I am perfectly willing to admit that the best plan was the old New England plan. The fathers builded better than they knew when they sent a boy to school for three months,

and then kept him at work for three months at the bench, in the fishing-boat, or on the farm. But we think we have outgrown that system. We compel the school-boy, while he is a school-boy, to keep at school all the time. We teach him to calculate how many bushels of oats can be exchanged against how many bushels of wheat, when oats are so much and wheat is so much, — and he does not, for all our teachings, know a kernel of oats nor a kernel of wheat when he sees them. Then, finding our boys good for nothing, we turn round and beg the schools to undertake their training. Just as we have made the schools teach a *little* music, and a *little* drawing, and a *little* sewing, we ask them to be good enough to teach a *little* filing, and a *little* planing, and a *little* sawing. But all this is merely overburdening the school system, which is overburdened already; and it does not provide for the separate training of each boy, according to his own personal ability.

What Mr. Ruggles's plan suggests is a school to which the boy shall come when he is of proper age to learn his trade, — where he shall first be tried, by an intelligent master, on different lines of work. The report which has been read explains to you the detail. In a few months, or perhaps weeks, we shall know whether this boy will be a good machinist, or a good founder, or a good carpenter, or good watchmaker. We shall know his physical aptitudes, his moral aptitudes; we shall know what line of work he can follow well. Then we shall be prepared to take him into the separate school, where that aptitude can be best developed.

I am told by skilful men, and I believe, that under two years of such careful training, for the new purpose of training, an intelligent boy will learn more than he would learn in seven years of the old apprenticeship, knocked about here and there, left to run errands or to take the rough work generally, — perhaps making rivets for a year, if there were need of rivets, or punching-holes for a year, if there were need of holes. If that estimate be true, our plan proposes to save

five years of each young man's life, and to give it to him as his freedom present, even before he comes of age.

We wish the State to add this developing system to its system of schools, because the State can do it better than any private corporation. The State has determined, wisely, that all the larger towns shall teach Latin and Greek in the public schools, shall prepare boys and girls for college. It has determined, wisely, that they shall teach drawing in those schools, resolving to develop the hardly budding genius of art in our manufactures. Let it determine, with the same wisdom, not to be dependent on the workshops of other lands for the skilled workmen whom it must have, if its great enterprises are to prosper.

It is an interesting reflection that when Robert Stephenson had conceived, and, I may say, determined on, that great invention of the locomotive, which has revolutionized the world, he knew so well what he needed, and the world needed, that he did not so much as attempt to build his model till he had first trained the machinists who were to build it with him. The machine-shop in which the "Rocket" was built had been first the training-school of the machinists who built her; and, when the great day of trial came, the result appeared. She did not break down on experiment in the competition with her rivals. They did. She did not need to be hauled off for repairs. What she was bidden to do she did. What he had prophesied, she performed. And the day that the great trial was over, modern society, had it only known it, was re-born! In that new birth it was needed that Robert Stephenson should fitly train a school of machinists to their duty.

I cannot but believe that so soon as the State throws the prestige of the public school system around its schools of industry, and opens them as freely as it opens its schools of Latin, of Greek, and of the higher mathematics, we shall see boys of enterprise and ingenuity and quickness of eye, repair to them with as much eagerness as boys now repair to

West Point or to Annapolis, — with more eagerness than they show in going to Yale and Harvard. The State will have provided what its system now lacks, and will meet the wants and aspirations, as it trains the inborn faculties, of every child of God born into its arms.

ELIZUR WRIGHT'S REMARKS.

Mr. President: The filing school, so thoroughly illustrated, seems to be quite aside from the aim of the report before the Association, and rather in the line which we wish to avoid. The tendency of the present system of manufactures is to turn the boy into a tool instead of a man, — a tool that must rust when out of employ, instead of a man who can get his living and more, everywhere. We wish to educate the boy, not into a filing tool of the highest possible perfection, or drilling tool, or turning tool; but into a master of so large a variety of tools, that he can create all the parts of some complicated and useful mechanism, so as to work, and produce something. Boyhood is not long enough to acquire absolute perfection in perhaps any one of a score of common old-fashioned hand-tools, which, used with the highest possible skill, can produce surprising and beautiful results.

The trouble is, if it *were* long enough, the beautiful result produced would not be the production of the twenty persons using the twenty tools, but of some superintending brain which used twenty human tools or twenty inanimate tools to produce it. Of all old-fashioned tools the file is perhaps the most painfully difficult to use perfectly. It lies at the very foundation of the metallic arts, and, without very high skill in its use, the present system of machinery could not have been born. But that once in existence, the importance and domain of the file, and the miraculously true filer, shrink almost into insignificance. If people were hereafter to be born without legs, the accomplishment of standing on one's head and walking on his hands would assume great impor-

tance. So if planing and turning engines, including the turning of irregular forms, were to be lost to mankind, the old marvellous skill in the use of the file might loom up again.

What we want in the field of practical education is some substitute for the dead apprenticeship system. In the presence of machinery in great establishments, the old trades which were handed down from father to son are either abolished or shrivelled to littleness.

The Yankee boy, the most constructive "critter" naturally in the world, is pretty much shut out from the sight of all sorts of tools. And, knowing nothing of tools, the machines which are made to do the work of the tools are a sealed book and a mystery to him. If he goes to a machine shop, they will, perhaps, take him on the footing of a tool, and set him to doing over and over, forever and ever, one particular thing; that is, if he does not disgust the superintendent by letting his machine do some mischief, which in his ignorance he is likely enough to do. He is a stranger in a strange city, in a perfect Babel maze of buzzing and clanking, the meaning of which is all Greek to him.

But suppose he had first been let into my friend Ruggles's proposed school-shop, furnished with a considerable variety of tools and machines, and encouraged to try his ingenuity in using them to make something — to make the various parts and put them together. He does not become perfect with any tool, but he becomes familiar with a good many. He has done something with them himself. He has through them achieved a certain mastery over matter. Let him now go into a machine-shop, or great mechanical manufactory, and though he may be set, as in the other case, to do one thing over and over, he understands and sympathizes with all that is going on. He catches the spirit of the place, and feels himself in some degree master of the situation. Instead of gloomily sinking to a level with the tool he is set to use, he seeks to command its best services in the hope of commanding others by and by.

One of the wisest sayings of the learned Dr. Samuel Johnson, it seems to me, when his friend asked him how he should educate his son for a literary career, was "Turn him loose in a library." There is a pretty large class of Yankee boys that would be sure to educate themselves if turned loose in a well-furnished shop. The addition of capable and kind teachers would not render it less sure.

MR. NEWELL'S REMARKS.

The discussion of the report was continued on the following evening, at the Institute of Technology, before the Society of Arts. It was participated in by Pres. Runkle, Prof. Whitaker, Prof. Watson, and others, including Mr. Newell, who expressed the thanks of Mr. Ruggles to the President of the society for his recognition of Mr. Ruggles's plan. Mr. Runkle had said that the plan in no manner conflicted with the Russian system, which he had in *part* adopted at the Institute of Technology. President Runkle has said, "I don't care if the student never touches a tool after he leaves the school. The course is justifiable, simply on the ground of the discipline it gives." Mr. Ruggles's plan was for teaching trades, arts or callings to *all the youth* who may desire, and have a natural inclination therefor, in the shortest possible time, compatible with a *perfect* knowledge of his chosen art, trade or profession. Mr. Ruggles is confident that two years' steady application, under the supervision of a competent teacher, will be ample time to teach the boy, of *average* mechanical capacity, his trade perfectly. Mr. Newell had said apprenticeship had departed, never to return in its ancient form. Something else must take its place. Rude labor only requires the strength of a stupid plodder. Dexterous labor, at present, was mostly performed by the "rule of thumb," or in ignorance of underlying principles. Skilled labor requires both dexterity and *thorough* knowledge of underlying principles.

It is well known that the workman who knows all the departments of his trade will always do better work in any *special* department. It may, therefore, be justly said that each laborer should possess skill — the more the better. In the "Developing School and School-Shops" proposed by Mr. Ruggles, the teachers would be paid a liberal salary. Each student would be advanced in accordance with genius, industry and acquired skill in his trade, art or occupation. The bright, ingenious, industrious pupils would not be required to go the same pace as the stupid and lazy. Each would have a chance to do his best to prepare himself for future usefulness in the shortest practicable time.

Mr. Newell said the School of Technology was a place for the training of philosophers, men of science, and men of leisure, who may not propose to learn any *particular* trade, art or occupation, but who desire to cultivate the sciences and the philosophies for the purposes of personal improvement, and hope to apply their knowledge to the advancement of human society. To the man of science, *science* is the end and aim.

He said that, to a great extent, teachers of pure science or knowledge are unfamiliar with its technical applications; and mere technical men are incapable of *teaching* the science they scarcely know themselves.

It is hard to say which is the more to be dreaded, — superficial science, applied to *practical* use, or profound science, applied with ignorance of the true aims and conditions of its application.

This discord of practice with science and art has been the great misfortune of our generation, and we must spare no pains to avert it from the next.

The discussion was a very entertaining and instructive one, and aroused much interest on the part of the audience.

Changes, Educational, etc. — Machinery in England — Kind of Technic Education.

That "the present" shows a continuation of the transition period in national life no one can doubt. We are having revolutions in science, in politics, in means of intercourse of nations by sea, in transport of goods and persons by land, and in the transmission of thought from place to place with such annihilation of time as to give the human being almost the advantage of omnipresence. How all these changes have altered the relations of men, communities, nations, to one another, most of us have had ample opportunity to know. These revolutions have been brought about mainly by discoveries in science of the laws and forces of material nature, and by inventions for rendering these forces the servants of man.

By science the sphere of knowledge has been indefinitely measured; by invention human power has been indefinitely extended. In our youth it sufficed to train a boy to his father's business, trade, skill or craft. For the present generation that training not only is inadequate, but even worse than the want of it. The English people have lost some two generations in the race of national improvement in trying to hold fast to old obsolete systems of doing work, as may be readily seen, by the many acknowledgments frequently made similar to the following extract from the London "Times": —

"British Trade and American Competition. — Except in chains and traces, cheap guns, ammunition, tin plates, and a few other specialties, trade with the United States is almost at a standstill; but merchants are compensating themselves for the flatness of the American market by pushing the sale of American-made goods in this country, where they meet with ready acceptance."

Sheffield advices through the same source are: —

"Great depression still hangs over the trade of this dis-

trict, and it is felt by many manufacturers that unless goods can be produced at a cheaper rate, the success of foreign competition will continue to be the rule. Acting upon this view of the case, some of our local firms have been quietly developing machinery by which certain classes of goods formerly imported from America or the continent are now being produced at rates which, it is hoped, will keep foreign articles out."

Also the following from the report at the annual meeting of the Sheffield Chamber of Commerce: —

"At the annual meeting of the Sheffield Chamber of Commerce, yesterday, the President said the manufacturers and workmen had only themselves to blame for loss of the American trade. American competition was successful, owing to the general adaptation of labor-saving machinery."

It will be readily perceived that there is a vast difference in the method of manufacturing in this country and in England. By our ingenious adaptation of machinery, and the many kinds of appliances to various processes of manufacturing in the different trades, arts and callings, we have taken from other countries much of the work formerly done by them. By the above extracts it will be perceived that they have been compelled to adopt, in some measure, the American method of doing work by machinery.

More than three-quarters of the former Geneva watch-business is now done in this country, and unless they bestir themselves by the application of machinery, and the different appliances to do such work, we soon may expect the whole. The great question comes home to every one of us, How shall we train the children who are to succeed us in this world, changed by science and invention, for the wide field of action that lies before them? Shall we go back to the old apprentice system and the former manner of doing work, and, by long practice, teach the youth to *stick* out his mouldings, make

sashes, blinds, doors, and plane all his boards *by hand*, when we have machinery to do all this work in one-tenth part of the time, and a great deal better? Why should we require the pupil machinist, by long practice, to FILE perfectly level surfaces, and straight edges and other similar work by hand, when we have the wonderful planing-machines, slabbing, shaping and slotting machines, etc., of various kinds, designed and admirably constructed to perform all that work in one-tenth part of the time, and much more perfectly? As we have such tools and appliances to take the place of the *file*, there is, consequently, not one-tenth of the work to be done now by the file as formerly.

What is necessary, and what must be done, is to teach every pupil every part of the whole trade, with a perfect knowledge of the use of every machine and appliance for doing work in his chosen trade or art, giving to him vastly superior knowledge over the old apprentice system, even were that obsolete way of doing work in existence. It is unnecessary for the youth to practise a long time to do good work wholly by hand, as formerly, costing ten times as much, in time and material; but we desire him to have a thorough knowledge of his business, and to become, as it were, master of the situation, and to be acquainted perfectly with the use of every tool, device, or convenience for doing such work in the cheapest as well as the best manner.

In the *Developing* School and School-Shop he will not be required to spend a moment of his time to profit any one, but devote the whole of his time for his *own* advantage. Should a skilled workman, in machine, cabinet, or most any mechanical business of forty years since, understanding perfectly the way of doing every kind of work that was done at that time, with all the facilities and appliances of that period, have fallen asleep at that date until the present time, then have "waked up" with all his former *skill* unimpaired, he would not be able to earn his "*salt*" (as we say) at his old business, as designed and done at the present day, with the improved machinery and appliances for

doing it. But let bygones be bygones. Let us put technical education within the reach of all our youth, as free as has been his common-school education. The aims and methods of the future will have to be created in harmony with the gradual advance of science and invention.

[From the "Boston Commercial Bulletin," Feb. 3, 1877.]

MR. RUGGLES'S PLAN FOR MANUAL EDUCATION.

The public interest in this subject is not an ephemeral thing. There has been a growing feeling in the public mind that some new departure must be taken in our educational system, to adapt it to the new wants created by the social and other changes of the past twenty years. There is not an intelligent man or woman who does not see that the existing system, excellent as it is for certain purposes, does not supply the youth of our cities with the education which will prepare them to earn a living.

But while this has been seen, the possibility of a change has hardly been considered except by a few. It has been taken for granted that the existing system had become so firmly established that no innovation would be tolerated. The discussion of the subject has, however, inspired hopes that some experiments will eventually be made, with a view of ascertaining what changes are most likely to remedy the confessed defects of the present methods.

Of the plans proposed, none have attracted more attention than those presented on the fourth page of the "Bulletin" to-day. We do no injustice to the committee, whose report we publish in full, when we give the credit of the plan to Mr. S. P. Ruggles, of this city, the chairman of this committee. Mr. Ruggles is well known as a successful inventor, and especially as a thoroughly practical mechanic, familiar with every description of mechanical labor and appliances. His long experience gives special value to his opinions as to the possible changes which can be made in our educational system.

The feature of his plan which impresses us most favorably is that in relation to the "Developing School," the purpose of which is to ascertain the natural tastes and preferences of the boys as to

the various mechanical avocations. The most difficult problem which presents itself in deciding in regard to a boy's future is, "What is he best fitted for?" It could almost be said truthfully that nine-tenths of the failures in life come from neglecting to decide this question intelligently. A single instance will illustrate our meaning. Mr. Rogers, whose fame as a modeller of statuary has become a household word in America, began life as a surveyor; but finding the business uncongenial, and the sunlight injurious to his eyes, he abandoned it and engaged in mechanical pursuits in connection with locomotive building. After following this for a while, he discovered his hidden taste for modelling, and leaving the machine-shop began, in a very small and unpromising way, the production of his "groups," earning at first hardly enough to support life, and being compelled to live in the most economical manner. But his success was assured, from the outset, by the fact that he had at last found an avocation for which he was perfectly adapted, and it was the work of but a few years to establish fame, competence and a permanent business. His history is that of thousands who, after blundering for years, and losing the best part of their early manhood, have at last found their place in the world. Of more it is true that, having once mistaken their calling, they have never rallied from the disappointments which attended the inevitable early failures, but have yielded up all ambition, and become almost useless members of society.

The "Developing School" proposed by Mr. Ruggles would aim, by placing a boy in contact with the tools and work of different trades, to assist him in choosing properly and wisely at first. The plan is a novel one, but the object aimed at is so desirable that the experiment ought to be tried. The school-shop is supplementary to the developing school, and has for its purpose the instruction of students in mechanical arts. It differs from the school-shop of the Russian system, which we have described in previous issues of the "Bulletin," in this, that it unites *in*struction with *con*struction, producing articles for sale, as well as imparting useful skill.

[From the Boston "Post," Feb. 5, 1877.]

MECHANICAL SCHOOLS.

No better evidence could be sought in favor of the industrial schools, which it is seriously proposed to make the educational supplement to our public school-system, than that which is so readily supplied by the approval of the community itself. The impression would seem to be almost universal that this is the very thing that is wanted. The hearings which are taking place at the State House on the establishment of these Art and Scientific Schools are but a corroboration of the opinions of Mr. Ruggles, of whose plans for providing a mechanical education for boys on leaving the public schools we have heretofore fully apprised the readers of the "Post." At present, the movement is instigated by the National Board of Trade, in a somewhat enlarged form from the one suggested by Mr. Ruggles; but the main purpose is the same as his, and any differences of detail cannot divide the interest that is visibly felt in the general project. The opinion of Hon. Elizur Wright, that our common-school system is set up "wrong end foremost," because children should be taught the use of tools before they learn to read, write and spell, deserves consideration as coming from a man who knows experimentally whereof he chooses to affirm, and feels a deep personal interest in the right advance of popular education. The Kindergarten idea is not so very far away from his as to be denied relationship, and may in time operate to bring his into universal recognition.

But until that question is put distinctly, as Mr. Wright now only suggests it, there is no special call for its discussion. The thing at present proposed is to provide Mechanical Schools that will take boys who have graduated at our public schools and help them to discover the bent of their minds and the facility of their hands, and thereby qualify themselves to enter upon life armed with the practical means of conquering a livelihood; instead of being left a burden for years to their parents, listless seekers for vacant places in stores, or, at the worst, an idle class from which vice and crime are wont to recruit their strength through the always ready agencies of temptation. To this end the reported remarks of Mr. Candler, Dr. Bowditch, Mr. Atkinson and Mr. Newell are worthy of careful attention. The fresh and vigorous ideas of Mr. Ruggles, too, not long since spread before the public

through these columns, are to be esteemed as the ones that pioneer this great educational improvement. If Boston were to inaugurate them in practice, as Mr. Ruggles showed she could do with great ease, and at trifling or no cost, she would do no more for the whole country in this regard than she has often done in many another. To have so far introduced the Greek method of education as to exchange music and the games for that mechanical skill which is the first demand of our modern material life will be entirely in harmony with the pretensions to Athenian thoroughness that are universally allowed to this community. The Legislature will unquestionably have the whole matter before them at the right time in a form for action that may bear early fruit.

[From the Boston "Saturday Evening Express," Jan. 14, 1877.]

DEVELOPING SCHOOL, AND SCHOOL-SHOPS.

The plan described in the paper read before the Social Science Convention, by John Newell, Esq., showing plainly the plan proposed by S. P. Ruggles, one of our oldest and most experienced practical mechanics, from its liberal provisions for all the youth when they leave our public schools, is worthy the attention of all the practical educators of the State and city. The boy, by this plan, selects his favorite occupation or trade, then is sent *free* to the "School-Shop," where he is *taught thoroughly* his trade or art in the shortest possible time; two years being considered ample time to obtain a perfect knowledge of his chosen profession, and some who have large innate taste for the same trade in less time. No pupil will be detained any longer than is absolutely necessary; the genius and diligent would not be held back to accommodate the dolt or the lazy. Our educators have done much that is commendable for general education, and ought, from their very position, to be able to see, know and readily understand what the public good demands. We have now in the State about 300,000 persons who have no practical knowledge in any trade, art, calling or profession by which to obtain a living, only being useful as a reserve from which a draft can be made for tramps, political bummers, thieves, jail-birds, candidates for all our penal institutions. Nine-tenths of all the criminals arraigned and corrected are persons who have no technical education.

We have lost one generation; let us redeem the time, and

provide for the youth who are to succeed us, ample means for a good practical education. Let our School Committee, as soon as they can ascertain "who is great in the kingdom," the head or the feet of the image, spend a little of *their* valuable time by investigating and suggesting some plan for the technical education of the 58,000 children placed under their charge, so that whenever they, or the grand attachés of supervisors launch them upon society, they may have some practical knowledge that will be an equivalent for daily bread. We need not go abroad for information as to how we shall live, or oppose those who do. Let it be our object to make good useful citizens, men and women, by giving them all an opportunity equally as free as the system of common schools, to secure a knowledge of some trade, art or calling in harmony with nature and their own inclination.

[From the Boston "Post," Feb. 2, 1877, revised, with additions.]

INVENTORS AND PRACTICAL EDUCATION.

To the Editor of the Boston Post: —

"Educate the people," was the first admonition addressed by Penn to the Commonwealth he founded. "Practically educate the people," was the last legacy of Washington. "Give to the people a good practical education," was the unceasing exhortation of Jefferson. I quote his authority with peculiar favor; for of all public men the world ever saw, he was the one whose greatest delight it was to pare down the functions of government to the lowest possible point, and leave the freest scope for the exercise of individual rights.

The monarch may distinguish his rule by advancing his people in civilization. The warrior may strike off the bonds from the limbs of the slaves, or scatter in the fields of conquest the seeds of literature and art; but the man who gives to the world a new power and teaches them how to use it has a royalty of his own. Newton, by developing the laws of gravitation, gave us a balance in which to weigh the planets of our own system, and the sun around which they revolve. Franklin, with his kite, stole the fire from heaven, subdued the spirit of the storm, and taught mankind to protect themselves from the torrents of his wrath. Franklin's kite-thread, along which the lightning travelled, was the line from

which was derived the electrical wire which now conveys men's thoughts and wishes over land and under the ocean.

Whatever diminishes the risk of life or health, in any mechanical operation, or any exertion of bodily labor, lessens the cost of production by diminishing the premium which is charged to cover the risk. Great changes have been effected within the last one hundred years by the skill and ingenuity of our American inventors: by Franklin; Eli Whitney, inventor of the cotton-gin, one machine doing the work of 5,000 field-hands; Robert Fulton, of steamboat and war-vessel celebrity; Cyrus McCormick, inventor of harvesting-machines; one acre of heavy grass was a good day's work for a man in mowing, while a boy, with a horse and his mowing-machine, cuts easily ten acres; Goodyear, with his practical rubber improvements; Samuel F. B. Morse, of Massachusetts, inventor of the electric telegraph, who, after suffering much tribulation and contests, was sustained by the courts, and realized a fortune from his valuable patents; Ross Winans, a native of New Jersey, the author of many inventions relating to railways, whose genius assisted the Russian Government in developing her principal railways.

We would like here to be permitted to speak of our fellow-citizen, S. P. Ruggles, who, from his early youth has been distinguished for his wonderful inventive talent. In 1832 Mr. Ruggles, when quite a young man, was an assistant at the Perkins "Institution for the Blind," in Boston, it being the first institution of the kind ever established in this country, and he has conferred more lasting and real benefit on the blind than any man in this or any other country.

He first invented a way of making a highly superior type for the printing in raised letters. There was then no paper in existence capable of receiving an impression from his new type. Mr. Ruggles invented a new kind of paper, by means of various kinds of sizing, so that it would retain the embossed impression; and after many trials and experiments with the strongest iron printing-presses in use, and after breaking two of them, he was obliged to invent and build a most powerful press of an entirely new construction. Each impression of that press gave a pressure of three hundred tons, and was worked by the blind pupils, and threw off twenty sheets per minute.

Mr. Ruggles next invented an entirely new method of making

maps for the blind, which proved eminently successful. His plan was a raised character, similar to his type, but arranged with such combinations that, at a most trifling expense, he could produce a succession of maps of any size and of any country. Maps made in this manner were never before known, and the Perkins Institution in Boston immediately issued from this very ingenious plan an Atlas of the United States, and also a General Atlas. The originality and simplicity of this invention excited the admiration of every one. It would, by most persons, be thought impossible, that separate type or characters could be so contrived as to admit of their being arranged in such a manner as to produce a map of any country, and then to use the same type to produce a map of any other country or place. Yet, difficult as this may appear, it was most perfectly accomplished by this new invention, every piece of type matching its neighbor with miraculous cunning, while following the crooked lines and angles or graceful curves of the various rivers, coasts, islands, lakes, bays, etc., with which such works abound.

By this invention, so decidedly superior to every other before known for conveying to them an idea of geography, the blind were introduced to a new world of thought, of study, and of reflection.

By the old method a map for the blind was produced by building up by hand, on a board, the objects to be represented. A small map by the old method would cost six or seven dollars, and would not contain one half as much information as one on the plan invented by Mr. Ruggles, and which would not cost as many cents!

He also produced the plates for a new Geometry, in raised characters; next a globe for the blind, in raised characters, some thirteen feet in circumference. In 1838 Mr. Ruggles went to Philadelphia and established one of his powerful presses for printing for the blind, in the institution in that city. The highest encomiums have been lavished upon his inventions in this country and in Europe. All the improvements made at the Perkins Institution for the education of the blind in printing and school apparatus were made by Mr. Ruggles, and by him alone; and after spending some seven or eight years at the institution for the blind, getting up printing and all school apparatus for their use, which required a perfect knowledge of a great variety of trades and mechanical

business, he left the institution and turned his attention to the invention and construction of job and card power presses for letter-press printing, being the first power presses ever made for that purpose, by which one boy was able to turn the press by a treadle with his foot and print more sheets per minute or hour than seven men and seven boys could do on the best presses then in use before that time for such purposes. By the manufacture and sale of these presses he made a large fortune. He has taken out some twenty-five patents, most of them being on entirely different machines or new subjects, a description and value of which it is not our purpose, at this time, to describe, but merely wish to show how early his innate genius, invention and skill in the many kinds of mechanical business commenced.

He retired from active business life some twenty years since, with an ample fortune. During his retirement he has been constantly busy with experiments, and carefully investigating many subjects, which his ample means and leisure have enabled him to do with great care and success. Several of his machines are in use in the United States, France, England and Russia, in their public workshops and private establishments. He has been an inventor from his early youth; and is now practically master of most every trade, art or calling, as the works of his own hands will demonstrate.

Mr. Ruggles is now endeavoring to convince our public educators of the importance of technical instruction for all the youth when they leave our public and private schools, as free to each pupil as was his teaching in the common school. He is also willing to assist in the establishment of these schools with his long experience and with his means, though he does not design or wish to hire the public to accept a plan fraught with interest to every youth in our land. His plan is purely American, and has met with the general approval of the press and our best educators. With a quick perception and ever-ready invention, for which from boyhood he has been remarkable, and a most wonderful faculty of adapting means to ends, he is in our opinion the right man to suggest to the public the best and most economical manner of introducing a system of practical education.

Boston, February 1.